

In th Claims

Please amend claims 1, 5, 7, 11, 15 and 17 as indicated below, wherein any additions to the amended claims are underlined, and any deletions to the amended claims are presented either within double brackets or as struckthrough text.

1. (Currently Amended) An ultrasonic cleaning apparatus in which ultrasonic vibration is applied to at least part of cleaning solution, and, by a piece-by-piece method, a material to be cleaned is cleaned with the cleaning solution while being carried in a predetermined direction, the ultrasonic cleaning apparatus comprising:

a plurality of ultrasonic vibration units each having a nozzle elongated in one direction, for spraying cleaning solution from the nozzle to the material to be cleaned, the cleaning solution being applied with ultrasonic vibration by a vibration plate to which a vibrator is fixed so as to pair up therewith,

wherein the plural ultrasonic vibration units are arranged in two rows in a widthwise direction orthogonal to the carrying direction, and

wherein at least some of the plural ultrasonic units in one row are displaced in relation to at least some of the plural ultrasonic units in the other row such that also
~~so arranged that~~ a substantially center of a certain at least one ultrasonic vibration unit of in one row is ~~located toward~~ aligned, in relation to the carrying direction, with a space defined between two adjacent ultrasonic vibration units of in the other row.

2. (Original) The ultrasonic cleaning apparatus of claim 1, wherein the ultrasonic vibration unit includes:

a holding member for holding the vibrator;

a power supply member for supplying a high frequency power to the vibrator by making elastic contact with an electrode of the vibrator and the holding member;

a wire for supplying the power to the power supply member; and

a casing having an enclosed space portion formed therein for accommodating the vibrator, the power supply member, and the wire, and

wherein the nozzle with a predetermined dimensional width is disposed adjacent to the vibration plate, the nozzle including a projection piece for supplying cleaning solution through which ultrasonic vibration is transmitted to the vibration plate and for convectively circulating the cleaning solution.

3. (Original) The ultrasonic cleaning apparatus of claim 2,

wherein, in each of the ultrasonic vibration units arranged, the casing includes:

a cleaning solution supply path for supplying cleaning solution to the nozzle;

an air supply path for supplying air to the enclosed space portion; and

a wire-laying path for laying down the wire required to supply the power to the vibrator.

4. (Original) The ultrasonic cleaning apparatus of claim 3,
wherein, in each of the ultrasonic vibration units, the casing is provided with an opening portion for providing communication among the enclosed space portion, the air supply path, and the wire-laying path,

and wherein, by circulating inert gas or dry air, the power supply member, the wire, and the vibrator are put under inert gas atmosphere or dry air atmosphere.

5. (Currently Amended) The ultrasonic cleaning apparatus of claim 4,
wherein the an internal pressure of is present within the enclosed space portion of the casing, and wherein is higher than the pressure of the cleaning solution which is supplied to the nozzle and is ejected therefrom at a predetermined pressure, the internal pressure being higher than the predetermined pressure.

6. (Original) The ultrasonic cleaning apparatus of claim 2,
wherein, in each of the ultrasonic vibration units, the vibrator and the power supply member are fastened to the casing constituting the enclosed space portion by screws and are thus detached therefrom with ease.

7. (Currently Amended) The ultrasonic cleaning apparatus of claim 2,
wherein the power supply member supplies the high frequency power supplied to the vibrator ~~is~~ within a range of 400 kHz to 2MHz.

8. (Original) The ultrasonic cleaning apparatus of claim 1,
wherein opening portions of both end nozzles arranged in the widthwise
direction are located so that the target material to be cleaned is interposed between
the both nozzles, as viewed in the carrying direction.

9. (Original) An ultrasonic cleaning method for cleaning both surfaces of a
material to be cleaned, comprising the steps of:

placing the ultrasonic cleaning apparatus of claim 1 toward a side of one
surface of a material to be cleaned so that cleaning solution applied with ultrasonic
vibration is sprayed to the surface of the material to be cleaned; and

placing a cleaning solution supply nozzle toward a side of other surface of the
material to be cleaned so that cleaning solution is sprayed to the other surface.

10. (Original) An ultrasonic cleaning method for cleaning a material to be cleaned,
comprising the step of:

placing the ultrasonic cleaning apparatus of claim 1 above a to-be-cleaned
surface of a material to be cleaned so that cleaning solution applied with an ultrasonic
vibration is sprayed to the material to be cleaned.

11. (Currently Amended) An ultrasonic cleaning apparatus in which ultrasonic vibration is applied to at least part of cleaning solution, and, by a piece-by-piece method, a material to be cleaned is cleaned with the cleaning solution while being carried in a predetermined direction, the ultrasonic cleaning apparatus comprising:

a plurality of ultrasonic vibration units each having a nozzle elongated in one direction, for spraying cleaning solution from the nozzle to the material to be cleaned, the cleaning solution being applied with ultrasonic vibration by a vibration plate to which a vibrator is fixed so as to pair up therewith,

wherein the plural ultrasonic vibration units are arranged in two rows in a widthwise direction orthogonal to the carrying direction, and wherein at least some of the plural ultrasonic units in one row are displaced in relation to at least some of the plural ultrasonic units in the other row such that also so arranged that at least one end of a certain at least one ultrasonic vibration unit of in one row is located toward aligned, in relation to the carrying direction, with a substantially center of an ultrasonic vibration unit of in the other row.

12. (Previously Presented) The ultrasonic cleaning apparatus of claim 11, wherein the ultrasonic vibration unit includes:

a holding member for holding the vibrator;

a power supply member for supplying a high frequency power to the vibrator by making elastic contact with an electrode of the vibrator and the holding member;

a wire for supplying the power to the power supply member; and

a casing having an enclosed space portion formed therein for accommodating the vibrator, the power supply member, and the wire, and

wherein the nozzle with a predetermined dimensional width is disposed adjacent to the vibration plate, the nozzle including a projection piece for supplying cleaning solution through which ultrasonic vibration is transmitted to the vibration plate and for convectively circulating the cleaning solution.

13. (Previously Presented) The ultrasonic cleaning apparatus of claim 12,

wherein, in each of the ultrasonic vibration units arranged, the casing includes:

a cleaning solution supply path for supplying cleaning solution to the nozzle;

an air supply path for supplying air to the enclosed space portion; and

a wire-laying path for laying down the wire required to supply the power to the vibrator.

14. (Previously Presented) The ultrasonic cleaning apparatus of claim 13,
wherein, in each of the ultrasonic vibration units, the casing is provided with an opening portion for providing communication among the enclosed space portion, the air supply path, and the wire-laying path,

and wherein, by circulating inert gas or dry air, the power supply member, the wire, and the vibrator are put under inert gas atmosphere or dry air atmosphere.

15. (Currently Amended) The ultrasonic cleaning apparatus of claim 14,
wherein ~~the~~ an internal pressure ~~of~~ is present within the enclosed space portion of the casing, ~~and wherein is higher than the pressure of the cleaning solution which is supplied to the nozzle and is ejected therefrom at a predetermined pressure,~~
the internal pressure being higher than the predetermined pressure.

16. (Previously Presented) The ultrasonic cleaning apparatus of claim 12,
wherein, in each of the ultrasonic vibration units, the vibrator and the power supply member are fastened to the casing constituting the enclosed space portion by screws and are thus detached therefrom with ease.

17. (Currently Amended) The ultrasonic cleaning apparatus of claim 12,
wherein the power supply member supplies the high frequency power ~~supplied~~
to the vibrator is within a range of 400 kHz to 2MHz.

18. (Previously Presented) The ultrasonic cleaning apparatus of claim 11,
wherein opening portions of both end nozzles arranged in the widthwise
direction are located so that the target material to be cleaned is interposed between
the both nozzles, as viewed in the carrying direction.